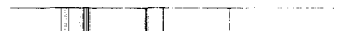
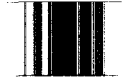
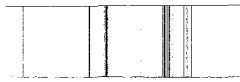


**SETTING PERSONNEL STRENGTH LEVELS:  
EXPERIENCE AND PRODUCTIVITY IN THE MILITARY**

The Congress of the United States  
Congressional Budget Office





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### **NOTES**

All years referred to in this report are fiscal years unless otherwise indicated.

Details in the text and tables of this report may not add to totals because of rounding.

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## PREFACE

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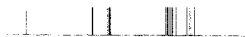
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The period since military conscription was ended in 1973 has been marked by a gradual shift toward greater seniority in the active enlisted forces. This shift is likely to continue into the 1990s, with large increases in the numbers of senior career personnel adding significantly to personnel costs and perhaps increasing productivity. This report, produced at the request of the Subcommittee on Military Personnel and Compensation, House Armed Services Committee, projects the future levels of experience in the enlisted forces and examines the cost and benefits of seniority growth. It also develops alternatives to the services' enlisted strength plans that reflect increased productivity. In accordance with the mandate of the Congressional Budget Office (CBO) to provide objective analyses, the report makes no recommendations.

Richard L. Fernandez of CBO's National Security Division prepared the report under the general supervision of Robert F. Hale and Neil M. Singer. Elizabeth Sterman, also of the National Security Division, prepared much of the data. The author thanks Stanley A. Horowitz of the Institute for Defense Analysis for his insightful review of an earlier draft. (External reviewers bear no responsibility for the final product, which rests solely with CBO.) Thanks go also to the Policy and Systems Integration Office, Directorate of Manpower and Organization, Headquarters United States Air Force, which provided unpublished data from an earlier study sponsored by the Air Force. CBO staff members Elizabeth Chambers, Paul Christy, and Michael A. Miller provided helpful comments. Francis S. Pierce edited the manuscript, assisted by Nancy H. Brooks, and Rebecca J. Kees prepared it for publication.

Edward M. Gramlich  
Acting Director

September 1987



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## SUMMARY

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Since the end of the draft in 1973, there has been a trend toward more senior enlisted forces. This trend, resulting from the higher reenlistment rates of true volunteers as compared with draftees and draft-motivated volunteers, has important consequences for personnel costs. The Congressional Budget Office (CBO) projects that seniority growth--that is, the increase in average years of service of enlisted personnel--in the four active services will raise real personnel costs in the early 1990s substantially above their 1987 levels. Over the five years 1988 to 1992, added costs will total at least \$1.4 billion, and perhaps as much as \$2.8 billion; in 1992 alone, costs will be higher by as much as \$720 million.

These projected cost increases, amounting to 0.8 percent to 1.4 percent of total enlisted personnel costs in 1992, are an obvious target for efforts to reduce Defense Department personnel expenditures. Seniority growth thus raises two important questions:

- o Will more senior forces offer benefits in terms of greater capabilities that will balance their greater costs?
- o How would increased capabilities affect the appropriate sizes of the enlisted forces?

This study provides preliminary answers to these two questions, as well as projecting the coming changes in enlisted seniority and in personnel costs. Available evidence on experience/productivity trade-offs in the military indicates that, as seniority increases through the early 1990s, all four enlisted forces will become considerably more capable. This may be a fairly inexpensive way to improve defense capabilities. Seniority growth also means that cuts in enlisted strengths below planned levels could perhaps be made without reducing planned capabilities.

## THE UPWARD TREND IN ENLISTED EXPERIENCE

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In 1974, 28 percent of the draft-era volunteers completing their first enlistment terms chose to reenlist. Four years later, the first-term reenlistment rate was up to 36 percent. As a result of this improved retention, the

percentage of personnel in years-of-service five through ten rose substantially between 1974 and 1980 in every service--in the Army, for example, from 15.4 percent to 24.0 percent. The percentage continued to rise in the 1980s, spurred by improved military pay, high civilian unemployment, and, perhaps, more favorable attitudes toward military service.

In the late 1980s and early 1990s, the large numbers of personnel currently in years-of-service five through ten should be reflected in the senior career forces. In the Air Force, for example, the proportion of the enlisted force with more than 10 years of service should rise from 28 percent in 1985 to 33 percent in 1994. The Army and Navy should experience similar gains, and the Marine Corps an even larger increase. In the latter service, this growth will come implicitly at the expense of the first-term force; in the other services, the percentage of personnel in years-of-service five through ten will drop. These projections assume that the services will not alter their reenlistment policies, that military pay will keep pace with pay in the private sector, and that the civilian unemployment rate will continue its decline through the early 1990s.

### COSTS OF SENIORITY GROWTH

Seniority growth accounts for more than one-fourth of the \$2.6 billion increase in real (inflation-adjusted) annual personnel costs that this study projects between 1987 and 1992 (see Summary Table 1). Seniority-growth costs are reflected in the Administration's budget request, although Administration estimates may differ from those of this study. No seniority growth is assumed in CBO's baseline projections of the federal budget, which are used by the Congress in the budget process.

Two factors contribute to the \$720 million projected cost of seniority growth: a rise in the average enlisted pay grade; and higher average pay levels because of longevity increases in basic pay.

### How Seniority Growth Affects the Mix of Pay Grades

Unless promotion rates are reduced or promotions slowed, rising seniority will increase the percentages of personnel in the top four of the services' nine enlisted pay grades. In the Navy, for example, this study projects an increase for pay grades E-7 and above from 9.5 percent in 1985 to 11.5 percent in 1992; in the Army, from 10.7 percent to 12.6 percent. The shifts in grade distributions will add \$300 million to personnel costs in 1992, rela-

tive to what costs would be if the aggregate mix of pay grades in each service did not change. The projected shifts continue at least into the mid-1990s, contributing to additional cost growth in those years.

The cost increases could be limited by slowing promotions, particularly to grades E-6 and E-7. If promotion times were delayed from 6 months to 21 months (depending on the service), the services' grade mixes would remain constant. Slowed promotion would adversely affect retention to some extent, an effect that this study did not explicitly consider.

### How Seniority Growth Affects Pay Rates

Even without richer grade mixes, seniority growth should increase personnel costs because longevity increases are a feature of the military basic pay

SUMMARY TABLE 1. SOURCES OF GROWTH IN PERSONNEL COSTS OVER 1987 LEVELS  
(In millions of 1987 dollars)

Source of Growth	1992	Total 1988-1992
Richer Grade Mix	300	890
Longevity Pay Increases	420	1,410
Personnel Strength Changes	660	1,830
Real Pay Changes	2,240	4,290
Changes in Retired Pay Accrual Rate <u>a/</u>	<u>-970</u>	<u>-3,110</u>
Total	2,640	5,310

SOURCE: Congressional Budget Office.

- a. Effects of changes in the normal cost percentage used in calculating the accrual charge for retired pay. Does not include effects of changes in real levels of basic pay.

table. Longevity increases reward length of service independently of the effects of promotion. Other cost elements--medical costs, for example--also will show growth as the enlisted forces become more senior. When the grade mix is held constant, seniority growth contributes \$420 million to personnel costs in 1992, and more in succeeding years.

## EXPERIENCE AND PRODUCTIVITY

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Two attempts to measure productivity at various levels of experience have yielded useful information. The Enlisted Utilization Survey (EUS), conducted by the RAND Corporation in the mid-1970s, examined productivity growth during the first enlistment term. Subsequent analyses of the data found strong relationships between experience and productivity in a broad cross-section of military occupational specialties. The second study, which looked at one Air Force specialty, found substantial growth beyond the first term.

### Productivity Indexes

Averaging across occupational specialties in the EUS yields plausible indexes of productivity by year of service over the first four years of service for the Army, Navy, and Air Force. Each shows very low productivity in the first year of service, reflecting time devoted to training when productivity is assumed to be zero. The Marine Corps was not covered in the EUS; the present study has used the Army index in examining Marine Corps productivity.

Because the results of the Air Force study were sensitive to the assumptions embodied in this analysis, the present study employs three alternative indexes to span the range of likely productivity growth. Case 1, which is consistent with the assumptions of the original analysis, shows senior personnel as roughly 52 percent more productive than those with four years of service completed. Case 2 simply halves the improvement over the fourth-year reference point. Case 3 arbitrarily imposes the assumption that productivity does not improve beyond the first term. These three indexes of productivity by year of service were assumed to apply equally well to all four services, and thus were linked to the first-term indexes developed from the EUS.

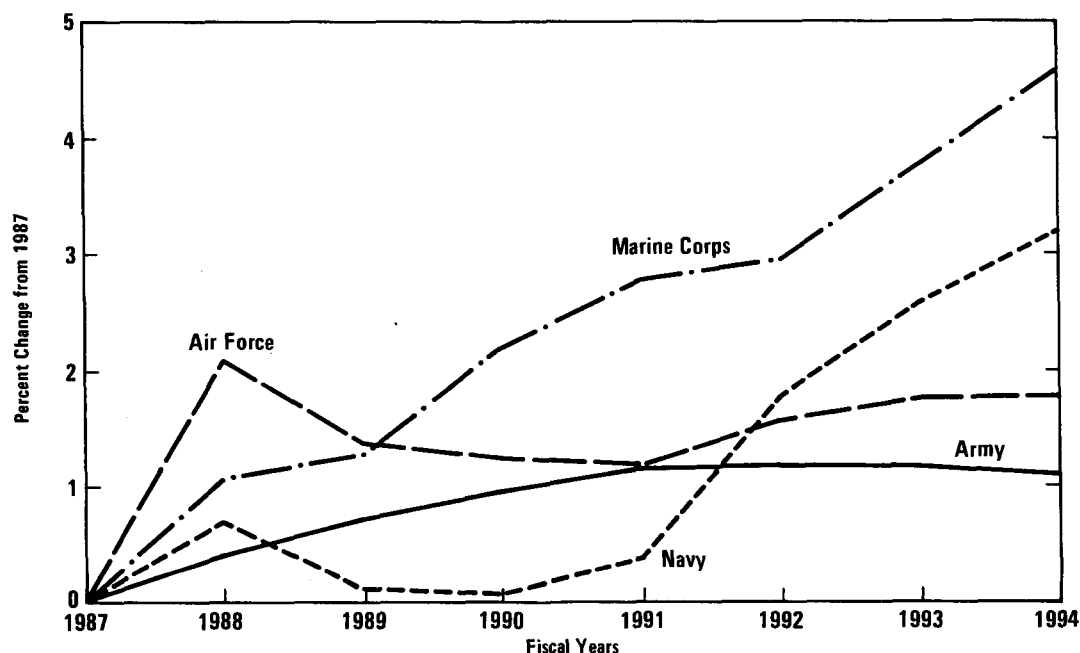
### Projections of Aggregate Productivity

Applying the productivity indexes to the projections of experience structures yields significant increases in aggregate productivity in all four services through the mid-1990s. The Summary Figure shows the percentage changes, relative to 1987, in average productivity (total productivity divided by total strength) under Case 1. In 1992, the gains range from 1.2 percent for the Army to 2.9 percent for the Marine Corps. Productivity for the Navy, in particular, is projected to continue growing beyond 1992, as the depressing effect of high numbers of new recruits diminishes with the completion of the Navy's planned strength increase in 1991.

Projected productivity gains are smaller under Case 2, generally about two-thirds as large as under Case 1. These gains probably represent a conservative lower bound on the true improvement that can be expected. The Case 3 gains average about half as large as those of Case 2, but it seems unrealistic to assume that experience beyond the first term adds nothing to productivity.

Summary Figure.

#### Projected Changes in Average Productivity (Case 1)



SOURCE: Congressional Budget Office.

NOTE: Average productivity projections were made by multiplying projected personnel strengths in each year of service by the corresponding value of the (Case 1) productivity index, summing the result, and dividing by total personnel strength.

Based on these results, allowing the projected seniority growth to occur would appear to be a less expensive means of achieving modest improvements in defense capability than, for example, increasing enlisted personnel strengths. Conversely, the gains in productivity might allow strength reductions relative to planned levels.

### ALTERNATIVES FOR ENLISTED STRENGTH LEVELS

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The Navy plans to increase enlisted strength by 5.3 percent between 1987 and 1992. If experience can substitute for numbers, the seniority growth projected here could raise Navy enlisted capabilities by 5.3 percent with a much smaller increase in strength. The Army, in contrast, plans no change in enlisted strength. It, too, will experience seniority growth, however, suggesting that the capabilities of the Army's 1987 enlisted forces could be maintained with smaller numbers of personnel. This study presents alternative enlisted strength levels for all the services, giving each service a profile of future aggregate productivity matching its profile of planned future strengths.

This approach assumes that the services have not already factored productivity growth into their personnel plans. In fact, planned personnel growth has been reduced in recent years, perhaps in part because of growth in seniority and productivity. Despite substantial seniority growth, however, service manpower reports contain no specific examples of large numbers of jobs being done by fewer, more senior personnel, which suggests that growth in seniority and productivity has not been fully considered.

Using the conservative productivity estimates of Case 2, this study finds that 35,000 fewer personnel would be required in 1992 than the Department of Defense plans (see Summary Table 2). Cost savings would amount to \$760 million in 1992, and over the five years 1988 to 1992 would total \$2.2 billion. In all services but the Navy, the cuts would reduce personnel strengths in 1992 below 1987 levels.

Under Case 1, which assumes full productivity growth consistent with the underlying studies, personnel reductions in 1992 relative to planned levels would amount to 52,000. Five-year cost savings would total \$3.6 billion, with a drop of \$1.1 billion in 1992 alone. Even the extreme assumption of Case 3--no growth in productivity after the first term--would result in a personnel reduction of 18,000 relative to levels planned for 1992.

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LIMITATIONS AND CONCLUSIONS

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Several factors place important limits on the usefulness of this productivity analysis and make it difficult to draw firm conclusions as to possible changes in enlisted strengths. The data underlying the indexes, the only information available, are very skimpy beyond the first term, somewhat out of date, and not entirely appropriate for application to an entire service. In addition, the services' manpower systems may not have the flexibility to take full and prompt advantage of the productivity improvements that come with greater average experience. Moreover, it is possible that some of the productivity improvements have already been taken account of in the services' plans. Clearly, more research on these issues is needed.

The reductions in personnel strength discussed in this paper should not be taken as recommendations for specific action. Until the needed research is completed, the alternatives above should be interpreted instead as indications of the general magnitudes of reductions that might be warranted. In the meantime, a conservative approach to policy changes seems appropriate.

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SUMMARY TABLE 2. ENLISTED STRENGTHS AND COSTS UNDER  
DEFENSE DEPARTMENT PLAN AND  
CHANGES UNDER CBO ALTERNATIVES

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	Strength in 1992 (Thousands)	Costs (In billions of 1987 dollars)	
		1992	Total 1988-1992
Defense Department Plan	1,871	52.2	252.9
Reductions under:			
Case 1	52	1.1	3.6
Case 2	35	0.8	2.2
Case 3	18	0.4	1.0

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SOURCE: Congressional Budget Office.

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A conservative approach does not mean that the effects of seniority growth should be ignored entirely. The services have apparently decided to accept increases in seniority that will add as much as \$720 million per year to their personnel costs by 1992, and they must have judged that the benefits of seniority growth are worth the cost. It seems reasonable to use the information contained in this analysis to review their decisions, especially considering the stringent limits that have been placed on defense spending as part of efforts to reduce the federal budget deficit.

## CHAPTER I

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### INTRODUCTION

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More than two million men and women serve today in America's active military forces. Roughly one-third of the Department of Defense budget is spent directly on these personnel: on recruiting, training, and transporting them; on providing for their housing, food, and medical care; and on paying them today and in their retirement. With military personnel costs absorbing so large a portion of the defense budget, and in light of continued interest in reducing the size of the federal budget deficit, considerable attention has naturally been focused on ways to reduce these expenditures.

Personnel costs in the 1980s and 1990s have been strongly influenced by the ending of military conscription in 1973. <sup>1/</sup> The introduction of the All-Volunteer Force (AVF) increased personnel costs in two important ways. First, the need to induce sufficient numbers of young men and women to volunteer for military service led to a substantial increase in basic pay and related costs: in preparation for the draft's end, the Congress in 1971 nearly doubled the pay of entering recruits. <sup>2/</sup> The second effect--less obvious because it would not be seen immediately--was a gradual increase in various cost elements, including pay, as first-term personnel were replaced by more senior service members.

The shift toward more senior enlisted forces was a consequence of the reliance on volunteers to meet the military's need for new recruits. As first-term personnel became more expensive, economy dictated a greater reliance on trained, experienced personnel. The shift occurred naturally because the recruits who entered the AVF, without any direct or indirect pressure from a draft, were more inclined than their predecessors to reenlist after completing their initial tours.

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1. Authority for the draft ended on July 1, 1973. The last draft calls were issued in December 1972.
  2. The raise in basic pay, over a typical recruit's first two years, amounted to 85 percent. More senior personnel received much smaller raises. Scheduled to take place in October 1971, the raise was delayed until November 14 by President Nixon's wage-price freeze. An additional across-the-board increase of 7.2 percent was given on January 1, 1972.

Because military careers span 20 or more years, the transition to a mature AVF is still under way. The enlisted forces of the 1990s will look quite different from those of the 1980s, in that much higher percentages of them will have more than 10 years of service. Personnel costs will be higher because more service members will be married, because military families will be larger on average, and, most important, because automatic pay increases for longevity will ensure a rise in average pay levels, even apart from the cumulative effect of annual across-the-board pay raises.

The coming changes in the experience structures of the enlisted forces raise some important questions, among them:

- o What will be the extent of the changes?
- o How much will they cost?
- o To what extent will the coming changes increase the capabilities of the enlisted forces?
- o How will increases in force capabilities affect the numbers of personnel needed in the four active services?

This paper attempts to answer these four questions. Chapter II presents projections of the experience structure of the enlisted force in each of the four active services and gives estimates of the cost increases that will result from the continuing maturation of the AVF. Chapter III tackles the more difficult third question: it examines the relationship between experience and productivity, using what data are available to derive indexes of productivity by year of service, and applies the indexes to the projections of Chapter II. The final chapter examines alternatives to the services' personnel plans that would exploit the projected seniority growth by substituting experience for numbers without sacrificing planned levels of capability.

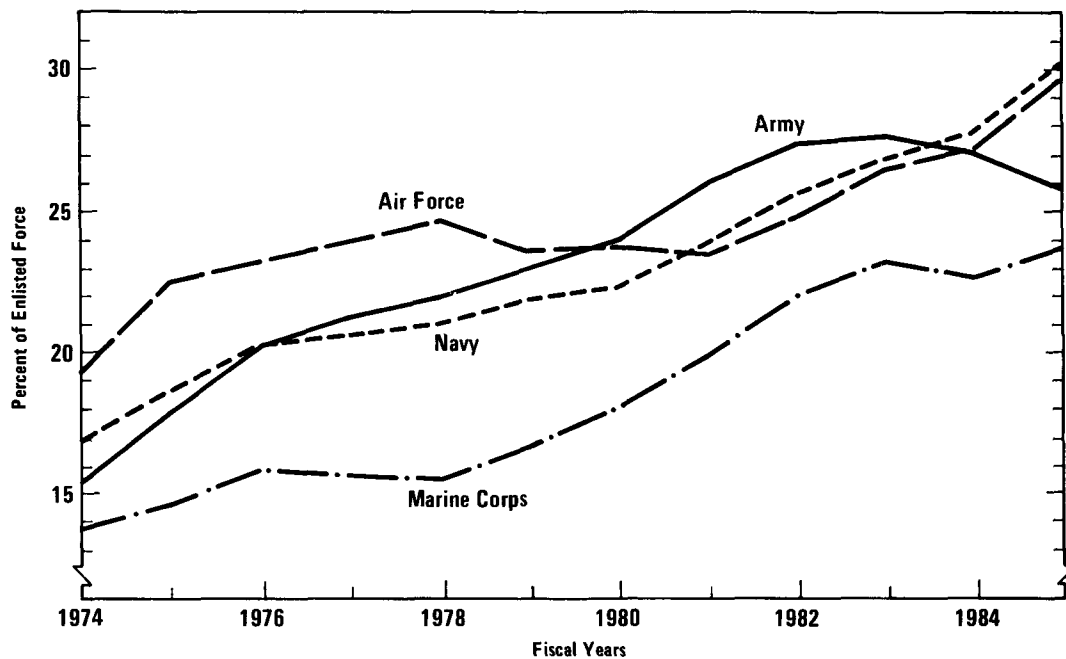
The remainder of this chapter sets the stage for what follows by showing the changes in enlisted experience structures that have taken place since the start of the AVF and giving a preliminary answer to the question: Is more experience desirable?

## BACKGROUND

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The draft-era volunteers (not draftees) who completed their first terms in fiscal year 1974 reenlisted at a rate of 28 percent across the four services (excluding ineligible). Four years later, the first-term reenlistment rate

Figure 1.  
Junior Noncommissioned Officers As Percent of  
Enlisted Force, 1974-1985



SOURCE: Congressional Budget Office, based on Department of Defense manpower statistics.

NOTE: Junior personnel are those in years-of-service five through ten.

was up to 36 percent. <sup>3/</sup> Figure 1 shows the major effect of this improved first-term retention. In 1974, junior noncommissioned officers--consisting for purposes of this study of those in years-of-service five through ten--accounted for 15.4 percent of the Army's enlisted force. By 1980, that figure had risen to 24.0 percent. Similar changes, though less extreme, took place in the other services during the 1970s. Although comparisons with 1974 are colored to some extent by the effects of post-Vietnam force reductions, the upward trend persisted into the late 1970s in all the services but the Air Force.

In its 1970 report, the President's Commission on an All-Volunteer Armed Force, better known as the Gates Commission, foresaw the change toward more senior enlisted forces: "The higher retention rate for true volunteers inevitably produces a more experienced force. Our projections

3. Department of Defense, Washington Headquarters Services, Directorate for Information, Operation, and Reports, *Selected Manpower Statistics Fiscal Year 1981*.

indicate that, by 1980, 45 percent of Army enlisted men will have four years or more of service experience, as compared with 31 percent for a mixed force [volunteers and draftees] of the same size." <sup>4/</sup> The actual percentage was closer to 50.

The Gates Commission could not foresee the events of the early 1980s. Two large military pay raises, high unemployment rates, and, perhaps, more favorable attitudes toward military service boosted the first-term reenlistment rate to nearly 50 percent in fiscal year 1983. The effect is apparent in Figure 1: the Army's junior noncommissioned-officer force rose to almost 28 percent of the total in 1983, while in the other services growth continued through 1985.

Is a more experienced force desirable? The Gates Commission thought so, noting that: "Since experience involves on-the-job training, a more experienced force is more productive than a less experienced one." <sup>5/</sup> The commission also pointed out that lower overall turnover, which is associated with a more senior force, reduces the number of personnel in training and other forms of "noneffective" status. Ten years later, the Defense Resource Management Study concluded that: "For many enlisted personnel occupational groups, a force with more careerists and fewer first-termers would be cost-effective based on current organizational structures." <sup>6/</sup>

Evidence that productivity grows with experience is provided by the obvious increase in earnings with age. Economic theory indicates that wages reflect a worker's marginal contribution to output, net of the value of any on-the-job training the worker is receiving. One study found that high school graduates aged 35 to 44 earned 68 percent more than those aged 22 to 24. <sup>7/</sup> A similar rise is evident in military pay tables: an enlistee with two years of service (in grade E-3) receives less than half as much in basic pay as one with 20 years of service (E-7). Although the connection between pay and marginal productivity is easier to show for the private sector than for the military, where occupational pay differences are small, the structure of military pay tables certainly creates a presumption that the services value experienced personnel more highly than junior personnel.

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4. *The Report of the President's Commission on an All-Volunteer Armed Force* (New York: Collier Books/The Macmillan Company, 1970), p. 40.
  5. *Ibid.*, p. 41.
  6. Donald B. Rice, *Defense Resource Management Study: Final Report* (Washington, D.C.: Government Printing Office, February 1979), p. 64.
  7. Gary S. Becker, *Human Capital* (New York: Columbia University Press, 1964), p. 138.